

## REPORT ON THE EXTINCT MAMMALIAN REMAINS AT LAKE MENINDEE, NEW SOUTH WALES

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IN 1939, while engaged in the work of the Harvard-Adelaide Universities Anthropological Expedition, Dr. J. B. Birdsell, then of the Peabody Museum of Harvard University, and Mr. N. B. Tindale, representing the University of Adelaide, discovered human remains and associated extinct marsupials at Lake Menindee along the Darling River in Western New South Wales. The discovery was made in connection with other studies in the area and only a few days were available for an investigation of the site. At that time, however, these workers were able to map and make a small collection of fossil remains and a larger one of artifacts from two of the exposures as well as explore the extent of the fossiliferous deposits on the northern shore of the then dry Lake Menindee. A notice of this discovery was made by H. L. Movius in 1940. World War II interrupted further investigation planned at that time.

While in Australia in 1953 on Fulbright Awards, Prof. R. A. Stirton and the writer, representing the Museum of Paleontology of the University of California, and N. B. Tindale, representing the South Australian Museum, reopened investigation of the Lake Menindee area. The work was partially financed by the Associates in Tropical Biogeography, by the Museum of Paleontology, both of the University of California; by donation from a friend of the University; and by the South Australian Museum.

In late March of 1953, Prof. Stirton and the writer spent nearly a month in the field concentrating on the discovery site and associated areas on the northwestern shore of Lake Menindee. Tindale directed the party to the locality and remained for the first week to collect additional artifacts and review the stratigraphy of the sites investigated. Our party was fortunate in recovering a large collection of mammalian remains which are now being studied in the Museum of Paleontology at the University of California. Additional human remains and artifacts were also obtained, which are housed in the collections of the South Australian Museum. The circumstances of the finding of the site and an account of the archaeology has been published by Tindale (1954). Detailed descriptions of fossil remains and other studies will be presented in the future by Tindale and the writer. In view of the unusual interest of this occurrence to students of human prehistory it was felt that the preliminary results of field work on the

mammal remains done in 1953 should be reported at this time despite the incompleteness of the studies.

The generous assistance and encouragement provided by Mr. H. M. Hale, Director of the South Australian Museum; Mr. N. B. Tindale, of the same institution; and Prof. R. A. Stirton, Chairman of the Department of Paleontology of the University of California, is gratefully acknowledged.

#### LOCALITY

The sites are four wind deflation hollows or "blowouts" in the sand hills formed along the north-western shore of Lake Menindee, New South Wales, immediately west of the point at which the former main road from Broken Hill to Menindee entered the lake bottom. This road had been replaced by a new main road, the old one being unavailable, as filling of the lake in 1950 after phenomenal rains had left standing water over a considerable portion of the usually dry lake bottom.

#### STRATIGRAPHY

Deflation by the wind has penetrated deep enough into the sand hills to expose a series of superimposed aeolian deposits separated by erosional unconformities. The following generalized section presents the stratigraphic succession as exposed in all four of the blow-outs.

Unit	Lithology	Thickness
1. (O of Tindale paper)	Light red dune sand, active, but partially "frozen" by locally thick growths of Cane Grass ( <i>Spinifex paradoxus</i> ). Erosional Unconformity	0-10 ft.
2. (A (upper))	Locally exposed unit of gray silty sand.	0-0.75 ft.
3. (A (lower))	Bright brick-red cross-bedded silty sand.	0-3 ft.
4. (B)	Reddish to buff cross-bedded sand containing small calcareous spheroidal to pipey sandstone concretions, and sandstone casts of roots. Base of exposed section.	6 + ft.

#### OCCURRENCE

Fossil remains and artifacts were collected from all of the units of the above section except the thin and locally exposed unit two. In making these collections the stratigraphic position of each specimen was recorded. Care was taken to also record the disposition of each specimen as it was desirable to know whether materials were found in place or as float on the present erosional surface of a

given unit. It is hoped that this data will allow us to assign specimens found scattered on the present erosional surface of the blow-outs to their proper stratigraphic position. This problem is a major one at the Lake Menindee sites as wind removal of the upper units has lowered fossil remains and artifacts from the upper units on to lower units. It would thus seem possible that any specimen not found *in situ* might have one of the following origins in terms of the local sequence:

- (a) Contemporaneous with deposition of the unit on which it is found.
- (b) Contemporaneous with the time represented by the erosional hiatus separating the unit on which it is found from the overlying unit.
- (c) Contemporaneous with any of the overlying deposits or the erosional hiatuses which separate them, including that of the Recent.

Fortunately the mammalian material, the bulk of which was collected from or on the present erosional surface of unit four (B), shows clear evidence of being derived from that unit. Mammalian remains were rarely met with in the overlying units, a fact which lessens the possibility of contamination by material of origin in the overlying deposits or hiatuses. On the other hand, material on the erosion surface of unit four (B) before unit three (lower A) was deposited may be represented in our collection as float from unit four.

In contrast with the mammalian material, relatively few artifacts were found in place and as such they present considerable difficulty of interpretation. The bulk of these materials was found scattered over the present erosional surfaces of all the lithologic units except unit two. Intrusive human burials were encountered but owing to the characteristic lithology of the exposed deposits they were easily detected.

Collections from each of the four areas investigated have been retained separately although it is clear that the lithologic units can be correlated from one site to the next. The following discussion, a summary of the material taken from each of the lithologic units, assumes such a correlation is justifiable.

#### UNIT 1. (O)

A bundle-type human burial was collected *in situ* from this unit. Another burial of undetermined type was found intrusive into unit four from unit one. A few artifacts and bones of recent mammals were found on the present erosion surface of this unit.

#### UNIT 3. (A)

Two flexed human burials were found with this unit. One was confined to this unit while the other was intrusive into unit four from unit three. These

burials may be contemporaneous with unit three, or may have been made from the surface of that unit during the time represented by the erosional hiatus separating unit three from units one or two. Two partial skeletons of the rat kangaroo (*Bettongia*) were found in place in this unit. Scattered artifacts were found on the present erosion surface of this unit.

#### UNIT 4. (B)

This unit yielded the bulk of the mammalian remains collected at the Lake Menindee sites. Some of these were materials collected on the surface of the unit and may belong to the time interval represented by the erosional unconformity between units four and three as mentioned above. In the main, however, the bulk of the material was taken *in situ* during the active phases of our work. Many of the bones found in place were checked and cracked as if exposed to weathering for a considerable time before burial. Frequently materials in place consisted of whole or partial skeletons, usually more or less articulated. These specimens were usually well preserved, suggesting rapid burial. Complete articulated skeletons of the smaller macropodids (*Bettongia* and *Lagorchestes*), and of the monotreme (*Tachyglossus*) were found in place. Specimens of the larger kangaroos were usually scattered, but interestingly enough, nearly complete articulated feet were not uncommon. In one case parts of the broken skeleton of a giant short-faced kangaroo (*Procoptodon*) were found closely associated. The mandible of this individual was still attached to the cranium, but most of the braincase was missing. Nearby the caudal vertebrae, sacrum and pelvis were found articulated. Articulated portions of both fore and hind limbs, broken isolated limb bones, and many small bone fragments were scattered within a radius of about a yard of the cranial and caudal portions of the skeleton. In several instances large marsupial bones showed clear evidence of having been burned. Small bits of charcoal were also commonly associated with mammalian remains *in situ* in unit four.

The evidence seems highly suggestive that the fossil mammal remains collected in place from unit four represent, to a considerable extent, man's selection of the game animals of the Lake Menindee area during the time unit four was being deposited. Thus at least part of the accumulation of animal remains in this unit might be regarded as a kitchen midden built up over a period of seasons when movements of game animals brought the nomadic hunters continually back into the area.

## LAKE MENINDEE ASSEMBLAGE

The mammalian remains collected *in situ* from unit four have been identified to generic level and are listed below. This group of mammals, termed the Lake Menindee assemblage, includes a somewhat selective sampling of the mammalian fauna living in the lower Darling River region during the time unit four was being deposited. Due to the fact that materials collected from the surface of unit four may actually belong to any one of the overlying units or erosional hiatuses I have included in the following faunal list only those genera that were found *in situ*.

MONOTREMATA	Tachyglossidae	<i>Tachyglossus</i> * (?) <i>Zaglossus</i>
MARSUPIALIA	Dasyuridae	
	Dasyurinae	<i>Dasyurus</i> s.l. * <i>Sarcophilus</i>
	Thylacininae	* <i>Thylacinus</i>
	Myrmecobiidae	(?) <i>Myrmecobius</i>
	Peramelidae	<i>Thylacis</i> (?) <i>Perameles</i> <i>Chaeropus</i> <i>Thylacomys</i>
	Phaseolonidae	* <i>Phascolonus</i> <i>Lasiorhinus</i>
	Macropodidae	
	Hypsiprymnodontinae	* <i>Propleopus</i>
	Potoroinae	<i>Bettongia</i>
	Macropodinae	* <i>Sthenurus</i> * <i>Procoptodon</i> * <i>Protemnodon</i> <i>Lagorchestes</i> <i>Onychogalea</i> <i>Wallabia</i> <i>Macropus</i> s. l.
	Diprotodontidae	* <i>Diprotodon</i>
RODENTIA	Muridae	
	Murinae	various living genera
	Hydromyinae	<i>Hydromys</i>

\* Indicates the genus is extinct to-day on the Australian mainland.

If the faunal list given above is compared with the list of genera of Recent mammals from the same region and allowance made for the incompleteness of the fossil representation, the Recent fauna appears as merely an impoverished remnant of the fossil assemblage. Extinction or change of range could account for

the differences. Among the genera still extant recorded in the fossil assemblage only the hairy-nosed wombat (*Lasiorhinus*) appears not to have lived in the immediate region in recent times. It occurs to-day in the general geographic proximity of Lake Menindee, along the lower Murray River, and probably enjoyed a much larger range in former times. If one excludes the mammals known to have been introduced during European colonization, the dingo stands alone in being the only member of the native Recent fauna known to have entered the area since unit four was deposited. Had these dogs been present it is difficult to see why at least some fragments of their skeleton was not preserved in deposits in which even man was represented. The absence of the dingo from the Lake Menindee assemblage is thus regarded as real until further collections demonstrate evidence to the contrary.

#### ENVIRONMENT AND AGE OF THE MENINDEE FAUNA

The change in the animal life of the region, as demonstrated by the comparison of the Lake Menindee assemblage and the present-day mammalian fauna from the same region, could be a result of the supposedly rigorous climatic changes that marked the end of the Pleistocene and the beginning of the Recent in Australia (for summaries of Pleistocene and Post-Pleistocene physical history see David and Browne (1950) and Fairbridge (1953)). Geological and associated studies in Australia have revealed that this climatic change involved an overall trend towards aridity broken only by minor reversals since the end of the Pleistocene. One of the results of this transition from the cool-moist conditions affecting a large part of Australia during the Last Glaciation to the warm-dry conditions of the Recent probably involved a great restriction in the large areas of suitable herbage necessary to support the diversity of late Pleistocene herbivores. Such a climatic change could have been the greatest single cause of the extinction of these forms. As we have seen from the evidence at Lake Menindee, man was a witness to this extinction. He might have accelerated the process of extinction in the case of some forms, but it seems unlikely that he played the major rôle.

Considering the above evidence, an early Recent age or at earliest late Pleistocene for the Lake Menindee assemblage seems the most reasonable inference. The study of the artifacts from the Lake Menindee sites offers evidence for close correlations with established sections on the Lower Murray River at Devon Downs and Tartanga (Hale and Tindale, 1930). The suggestion exists therefore, that the mammalian assemblage can be correlated with a known cultural sequence. Suitable carbonaceous materials on which to conduct absolute

age determinations by the carbon 14 method may be present but have not been obtained as yet on the site. If sufficient fresh water shell material can be recovered on further work it may be possible to obtain a dating.

### CONCLUSIONS

The evidence gained from a preliminary study of the material collected from unit four (Layer B) at Lake Menindee suggests the following conclusions :

1. Man was a contemporary of extinct marsupials in Australia.
2. Man hunted these animals as a source of food.
3. The accumulation of animal remains in this unit probably represents a kitchen midden built up over a period of seasons when movements of game animals brought the nomadic hunters continually back into the area.
4. The dingo probably was not present in western New South Wales at the time unit four (B) was being deposited.
5. The Lake Menindee assemblage lived at a time when a more equable climate prevailed over this part of Australia, either at the close of the Pleistocene or at the beginning of the Recent.

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